Analysis of Mechanically Separated Poultry for Moisture, Protein, Fat, and Ash

Introduction

Accurate control of moisture, protein, and fat in mechanically separated poultry meat is important for quality and cost-effectiveness. Accurate blending is vital to profitability. Fat and protein are cost drivers while moisture impacts viability, texture and use of the products. In all instances, cost savings are dependent both upon the accuracy of the analyses and the availability of real-time results. Using the DA 7250 at-line NIR, operation staff can perform their own analysis 24/7 and have instant access to the results. The results can be used for process optimization and prevention of costly mistakes.

The Near Infrared Reflectance (NIR) technique is particularly suited for measurement of mechanically separated poultry, but limitations of older technology instruments did not allow users to reap the full benefits of NIR. Older instruments often required samples to be put through a homogenizer or extensive clean-up of samples cells. The DA 7250 requires little or no clean-up between samples as they are analyzed as-is in open faced, disposable cups.

Diode Array Instruments

The DA 7250 is Perten's 3rd generation diode array based, full-spectrum, NIR instrument designed for use in food processing industries. The innovative diode array technology performs each multi-component analysis in seconds with no sample preparation required. During this time, a large number of full spectra are collected and averaged. The instrument case is fully sealed and requires no external computer for operation. Full connectivity allows it to be connected to LIMS and/or process software. Since the sample is analyzed in a disposable cup in the DA 7250, the problems associated with glass cells are avoided and operator influence on results is minimized.

Data Collection

Approximately 200 samples of mechanically separated poultry from several US processing plants served as the calibration set. The spectral data was collected using a DA 7250 equipped with the Disposable Cup Module using 2 oz. disposable cups. The reference chemistry was supplied by the customers and was conducted following the AOAC methods: Moisture – Microwave 985.14, Protein – Combustion 990.03, Fat – Microwave/NMR 2008.06, Ash – Furnace 942.05. Calibrations were developed using Partial Least Squares (PLS) regression. A Perten proprietary harmonization method was applied as a pre-treatment to the spectra.

Results and discussion

The results are very accurate when compared to the results from the reference methods. Statistics for the respective parameters are presented in the table below and graphs are displayed on page 2.

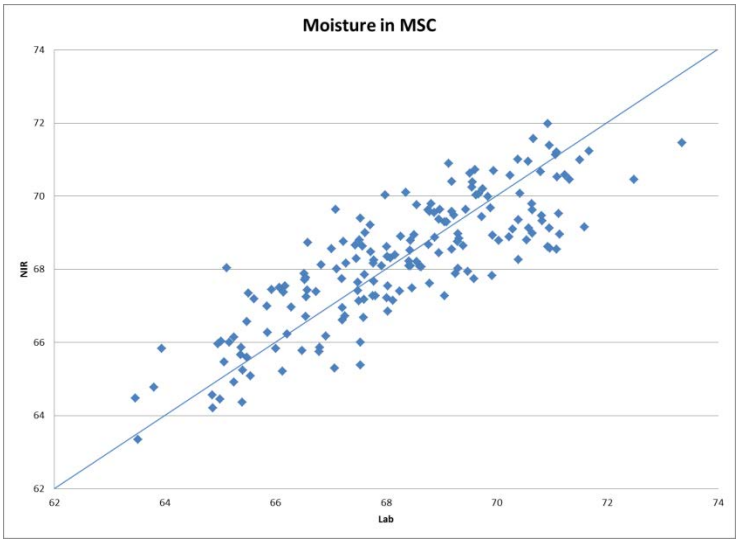
Parameter	Range	Samples	R
Moisture	63.47 - 75.03%	180+	0.831
Protein	12.32 - 16.41%	180+	0.819
Fat	11.31 - 19.35%	180+	0.800
Ash	0.69 - 3.79	180+	0.987

The differences between the DA 7250 and the reference methods are of the same magnitude as typical differences between two different reference labs. The DA 7250 is more precise than the reference methods, meaning that replicate analyses are generally more repeatable and representative.

In summary, it is concluded that the Diode Array instruments from Perten can accurately analyze mechanically separated poultry. The speed of analysis allows users to easily and accurately analyze many samples a day in nearly real-time. The disposable cups remove the need for a homogenizer and laborious cleaning of cells. The instrument's ease of use and flexibility – it can also analyze liquids, slurries, powders, oils etc.– make it ideal for use it poultry plants worldwide.

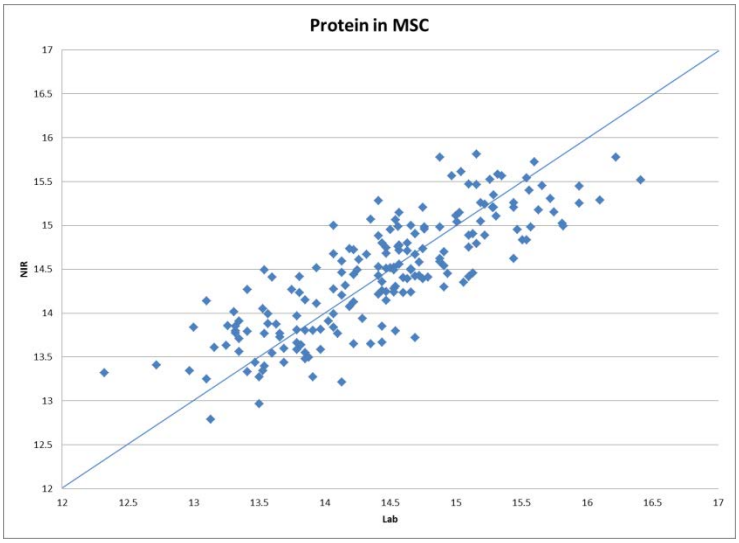
Moisture

Moisture is an important and accurate measurement using NIR.



Protein

Protein is an important nutritional value for mechanically separated meats.



Fat

Accurate and fast Fat analyses are essential to monitoring the efficiency and profitability of a mechanically separated meat facility.